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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,061	01/23/2004	Akihiro Maesaka	09792909-5776	7621

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SONNENSCHN NATH & ROSENTHAL LLP
P.O. BOX 061080
WACKER DRIVE STATION, SEARS TOWER
CHICAGO, IL 60606-1080

EXAMINER

MENZ, DOUGLAS M

ART UNIT	PAPER NUMBER
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2891

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/764,061

Applicant(s)

MAESAKA, AKIHIRO

Examiner

Douglas M. Menz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 7-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 13-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4 and 13-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Kamijo (US 6819532).

Regarding claims 1 and 13, Kamijo discloses a magnetic memory device comprising:

a first wiring (51, Fig. 10);

a second wiring (52, Fig. 10) intersecting three-dimensionally with said first wiring; and

a storage cell (50, Fig. 10) positioned at an intersecting area of said first wiring and said second wiring for writing/reading information of a magnetic spin (Fig. 10 and Col. 20, line: 54 – Col. 21, line: 10), wherein:

a sidewall portion (37, Figs. 6-7) of said second wiring electrically connecting to said storage cell has a forward tapered shape having a contact angle relative to an

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upper surface of said storage cell being 45 degrees or more (*note: Kamijo discloses that the structures of figs. 6-7. are placed in the array of fig. 10 (Col. 20, line: 54 – Col. 21, line: 10), therefore, the electrode 37 is in electrical contact with the conductor 52 and as such the examiner interprets the electrode 37 in conjunction with conductor 52 to read on applicant's limitation of "second wiring").*

Regarding claims 2 and 14, Kamijo further discloses wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, and a ferromagnetic free layer (Fig. 6 and Col. 17, line: 38 – Col. 18, line: 67).

Regarding claims 3 and 15, Kamijo further discloses wherein:

said storage cell is the one in which said non-magnetic spacer layer (34, Fig. 6) is a tunnel barrier made of an insulator (Col. 18, lines: 45-50);

and said two ferromagnetic layers (33 and 35, Fig. 6) and said non-magnetic spacer layer (34) located between said two ferromagnetic layers form a magnetic tunnel junction (Fig. 6 and Col. 17, line: 38 – Col. 18, line: 67).

Regarding claims 4 and 16, Kamijo further discloses wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising a lower electrode (31), an antiferromagnetic layer (32), a ferromagnetic fixed

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layer (33), a non-magnetic spacer layer (34), a ferromagnetic free layer (35), and a protecting layer (36) in this order from bottom (Fig. 6 and Col. 17, line: 38 – Col. 18, line: 67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-6 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamijo (US 6819532) in view of Amano et al. (US 6801414).

Regarding claims 5 and 17, Kamijo discloses the structure of claims 1 and 13 as mentioned above. However, Kamijo does not disclose wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

Amano discloses a TMR device for a magnetic memory (Fig. 4c and Col. 10, line: 8 – Col. 12, line: 25) wherein said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode (301), a ferromagnetic fixed

layer(304a, Fig. 4c), a nonmagnetic spacer layer (306, Fig. 4c), a ferromagnetic free layer (307, Fig. 4c), an antiferromagnetic layer (311, Fig. 4c), and a protecting layer (312, Fig. 4c) in this order from bottom.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Amano's cell structure into Kamijo's MRAM structure because Kamijo specifically suggests interposing various cell structures (50, Fig. 10) into the magnetic memory structure of Fig. 10 (Col. 20, lines: 55-65).

Regarding claims 6 and 18, Kamijo discloses the structure of claims 1 and 13 as mentioned above. However, Kamijo does not disclose wherein:

said storage cell is a magnetoresistive effect device including a stacked structure comprising, a lower electrode, an antiferromagnetic layer, a ferromagnetic fixed layer, a non-magnetic spacer layer, a ferromagnetic free layer, a non-magnetic spacer layer, a ferromagnetic fixed layer, an antiferromagnetic layer, and a protecting layer in this order from bottom.

Amano discloses a TMR device for a magnetic memory (Fig. 4c and Col. 10, line: 8 – Col. 12, line: 25) wherein said storage cell is a magnetoresistive effect device including a lower electrode (301, Fig. 4c), an antiferromagnetic layer (303, Fig. 4c), a ferromagnetic fixed layer (304a, Fig. 4c), a non-magnetic spacer layer (306, Fig. 4c), a ferromagnetic free layer (307, Fig. 4c), a non-magnetic spacer layer (308, Fig. 4c), a ferromagnetic fixed layer (309a, Fig. 4c), an antiferromagnetic layer (311, Fig. 4c), and a protecting layer (312, Fig. 4c) in this order from bottom.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Amano's cell structure into Kamijo's MRAM structure because Kamijo specifically suggests interposing various cell structures (50, Fig. 10) into the magnetic memory structure of Fig. 10 (Col. 20, lines: 55-65).

Response to Arguments

Applicant's arguments filed 12/15/05 have been fully considered but they are not persuasive.

Applicant argues that the amount of tapering of (37, Fig. 6) is unknown. As mentioned above, the Examiner contends that, given the representation of 37 in Figs. 6-7, Kamijo anticipates a forward taper of 45 degrees or more.

Applicant further concedes that Kamijo discloses placing the structure of Fig. 6 into Fig. 10, however, Applicant argues that such teachings do not disclose a sidewall portion connected to the storage cell having a forward taper being 45 degrees or more. As previously mentioned, Figs. 6-7 disclose such teachings. Furthermore, when the structure of Figs. 6-7 are placed into Fig. 10 as taught by Kamijo, all the limitations of claim 1 would be anticipated.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas M. Menz whose telephone number is 571-272-1877. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



CHRISTIAN D. WILSON
PRIMARY EXAMINER

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